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Original Article

Comparison of the oral health and self-rated general health status of undergraduate students in Taiwan and Japan

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Abstract *Background/purpose:* Scores of the Oral Salutogenic Score (OSS) and Medical Outcomes Study Short Form-20 (MOS SF-20) of university students in Taiwan and Japan were determined to compare the oral and general health status of students in these 2 countries.
Materials and methods: The oral health of students enrolled in 1 national university and 1 private university from each country were examined by trained dentists. Student ages ranged 18–25 years with 674 (371 males and 303 females) from Taiwan and 1117 (506 males and 611 females) from Japan. For convenience, 1 national university and 1 private university from each country were chosen, and students not majoring in oral health were investigated using a self-administered questionnaire filled out by all students. The questionnaires consisted of the MOS SF-20 and OSS. The students' oral-health conditions were examined by 10 dentists in Taiwan and Japan after undergoing training on private university students in each country.
Results: As to questions concerning general health, 20% of Japanese university students answered "excellent" compared to only 5–10% of Taiwanese university students. Values of the decayed, missing, and filled permanent teeth (DMFT) index were 4.8 and 5.0 for male and female Japanese students, and 5.9 and 8.0 for Taiwanese ones. Values of the DMFT index of the first permanent molar were 2.1 and 2.3 for male and female Japanese students, which

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were lower than those of Taiwanese (2.3 and 2.9, respectively) (adjusted odds ratio: 13.1; 95% confidence interval: 3.9—44.3). The proportion of Taiwanese students with swollen gums was higher than that of Japanese students (adjusted odds ratio: 5.3; 95% confidence interval: 4.1—6.7). The proportion of Taiwanese students who had access to a family dentist was lower than for Japanese students (adjusted odds ratio: 5.3; 95% confidence interval: 4.1—6.7). Indices of health perception on the MOS for Taiwanese (51.8—58.2%) were lower than those of Japanese students (69.3—72.3%). The Japanese student's physical functioning, social functioning, health perceptions, and pain scores were significantly better than those of Taiwanese students ($P < 0.001$). The Taiwanese student's mental health score was significantly higher than that of Japanese students ($P < 0.05$).

Conclusion: The status of oral and general health of Taiwan students was worse than that of their Japanese counterparts. This might have been due to differences in regularity of visiting family dental services, health perceptions, public oral-health policies, preventive strategies during early life stages, and health perceptions of students.

Introduction

There are many determinants related to people's general and oral health.[1—12] These include but are not limited to an individual's physical, heredity, lifestyle, health literacy, physical, social, policy, and environmental factors. In addition, a broad spectrum of policies, the organization of health care, and the access to quality health care are key health determinants.

According to Andersen's behavioral model,[7] there are also many factors that affect the general health and oral health outcomes of a population, in terms of the health care system, population characteristics such as culture and values, educational and socioeconomic class, income, and insurance.

International comparisons may enhance mutual learning experiences that are beneficial to health promotion by individual countries.[13—15] Cross-national studies on health behaviors, which are influenced by cultural and social norms, are difficult, because there are overlapping cultural and other influencing factors, such as values, knowledge, socioeconomic status, and personal experience. Tools with high reliability and validity are now available to measure the oral-health behaviors and attitudes of dental students and the elderly.[16—24] It was shown that a self-evaluation of one's health is useful in evaluating the effectiveness of health programs.[25,26]

In findings of an International Comparative Study conducted by Nakagaki, health consciousness and oral-health scores were strongly correlated among 12 countries; university students had better oral health and better attitudes toward oral health than did university students in Asia and South America; oral-health conditions may reflect their social economy, oral-health promotion, and policy efficiency.[27]

There was a comparative study using the (CPI) between Taiwan and Japan in 1987, and findings showed that Taiwanese college students were more likely to have periodontal disease than were Japanese students.[28]

The purpose of this study was to determine and compare the Oral Salutogenic Score (OSS) and Medical Outcomes Study Short Form-20 (MOS SF-20) scores between Taiwanese and Japanese university students to evaluate their oral health and general health status, and compare the oral conditions of private university students in both countries using an oral examination by trained dentists.

Materials and methods

Subjects

Students, whose ages ranged 18—25 years, were enrolled in 4 universities (2 from each country) (674 in Taiwan including 371 males and 303 females) and 1117 in Japan including 506 males and 611 females (Table 1). For convenience purposes, students not majoring in oral health at 1 national university and 1 private university from each country were investigated using self-administered questionnaires filled in by all students. The questionnaires consisted of the MOS SF-20 and OSS. Oral-health conditions of each of those private university students were examined by trained dentists.

The MOS SF-20 questionnaire

The MOS SF-20 questionnaire, known for its high validity and reliability,[29—31] was used to evaluate a student's own perceived level of their general health. The questionnaire has 20 questions related to 6 health concepts: physical functioning (PF; 6 items), mental health (MH, 5 items), role functioning (RF; 2 items), social functioning (SF; 1 item), health perceptions (HP; 5 items), and pain (1 item).

Health-related functioning was measured using the Japanese and Chinese translations of the SF-20.[32—35] The SF-20 is a generic health measure which permits group comparisons of the relative burden of disease. It measures health-related functioning and well being along the following subscales: (1) PF measures the ability to perform physical activities, e.g., walking shorter or longer distances, lifting heavy objects, lifting and carrying groceries, climbing stairs, bathing, and dressing; (2) role limitations because of physical health problems (RF) assess one's physical ability to perform work or other daily activities; (3) SF covers the ability to perform normal social activities; (4) general MH measures one's state of mind such as happiness,

Table 1 Distribution of gender of study subjects by country and type of university.

Country	Type of university	Male	Female	Total
Taiwan	Private	172	106	278
	National	199	197	396
Japan	Private	200	200	400
	National	306	411	717
	Total	877	914	1791

Table 2 Percentage of university students with experience of decayed, missing, and filled permanent teeth (DMFT).

	Male (%)	Female (%)
Taiwan	84.3	93.4
Japan	80.5	86.5

The rates of experiencing DMFT showed no significant differences between male and female Taiwanese and Japanese students.

peacefulness, nervousness, and depression; (5) general HPs are based on the assessment of one's health; and (6) pain assesses limitations in the ability to work or engage in other daily activities because of pain.

Participants were asked to complete a SF-20 questionnaire general measure of one's health status by themselves. The, PF, RF, SF, MH, HP, and pain subscales of the SF-20 were separately calculated, and each subscale has a score of 0—100. A higher score represents better health for the PF, RF, SF, MH, and HP subscales. For pain, a lower score represents less pain and a higher score more pain. We calculated the mean and standard deviation (SD) for each subscale by country, private and national university setting, and gender.

The OSS

The OSS questionnaire[36] was originally developed to assess oral health and related lifestyle parameters in connection with a Japanese campaign called "8020" that set a target for people to retain 20 teeth at the age of 80 years. The OSS is a self-assessment questionnaire containing 10 questions each scored on a scale of 0—20. Answers are converted into points and weighted according to their importance. Higher scores indicate good oral maintenance.

Reliability of the questionnaires

The original English questionnaires were translated into Chinese. To check the accuracy of the translations, they were back-translated using Cronbach's α coefficient. The average scores of the 2 countries for the MOS health concepts were >0.73 which are acceptable scores.

Inter-examiner calibration

Oral-health conditions of each private university student were examined by dentists. Before the oral examination, an inter-examiner calibration was conducted and was checked using the Kappa statistic. The average scores for the 2 countries were 0.8.

Data analysis

The MOS total score were recalculated using a method of Ware et al.,[30] and statistical analyses were performed on the OSS. A three-way analysis of variance (ANOVA) was used to test differences in country, type of university, and gender. A multivariable logistic-regression analysis was used to adjust for gender, a missing first permanent molar, lifestyle, and oral-health status. A Chi-squared test was used to assess differences in the rate of experiencing DMF, rate of DMFT, and rate of missing teeth among Taiwanese and Japanese students. Analyses were undertaken using SPSS 11.OJ for Windows[37] (Chicago, IL, USA).

Results

Oral-health conditions

The caries prevalence rates in Taiwanese students were 84.3 in males and 93.4 in females; those among Japanese students were 80.5 in males and 86.5 in females (Table 2). The rate of experience of DMF showed no significant differences between Taiwanese and Japanese males and females. Values of the DMFT index (Table 3) of Taiwanese university students were 5.9 in males and 8.0 in females compared to 4.8 in male and 5.0 in female Japanese counterparts. The Taiwanese students' rates of DMFT were significantly higher than those of Japanese students for both males and females ($P < 0.001$). Values of the DMFT index of the first permanent molar of Taiwanese university students were 2.3 in males and 2.9 in females compared to 2.1 in their male and 2.3 in female Japanese counterparts. As to the loss of the first permanent molar (Table 4), 7.0% of males and 11.3% of females in Taiwan and 1.0% of males and 0.5% of females in Japan had missing ones. After adjusting for gender, the odds ratio (OR) of a missing first permanent molar between the 2 countries was 13.1 (95% confidence interval (CI): 3.9—44.3) (Tables 5 and 6).

The proportion of Taiwanese university students who had gum swelling (45%) was higher than that of their Japanese counterparts (13%). After adjusting for gender and type of university, the OR was 5.3 (95% CI: 4.1—6.7).

Table 3 Average number and rate of decayed, missing, and filled permanent teeth (DMFT) and missing teeth (MT).

	Taiwan		Japan	
	Male	Female	Male	Female
DMFT index	5.9	8.0	4.8	5.0
DMFT rate (%)	21.0	28.6	17.0	17.9
MT index	0.2	0.3	0.1	0.1
MT rate (%)	0.6	1.2	0.4	0.4

Table 4 Number and percentage of students missing their first permanent molar.[a]

n (%)	Taiwan		Japan	
	Male	Female	Male	Female
With all first permanent molars	160 (93.0)	94 (88.7)	198 (99.0)	199 (99.5)
Missing a first permanent molar	12 (7.0)	12 (11.3)	2 (1.0)	1 (0.5)
Total	172 (100)	106 (100)	200 (100)	200 (100)

[a] Odds ratio (adjusted for gender) of missing the first permanent molar for Taiwanese university students: 13.1 (95% confidence interval: 3.9—44.3).

The proportion of Taiwanese university students who had a family dentist (17.1%) was lower than their Japanese counterparts (46.3%). There was a significant difference after adjusting for gender and type of university ($P < 0.001$). The proportion of Taiwanese university students who had hobbies (87.6%) was higher than their Japanese counterparts (83.7%). There was a significant difference between the 2 countries after adjusting for gender and type of university ($P < 0.05$).

The proportion of Taiwanese students who smoked (10.0%) was lower than their Japanese counterparts (13.2%). There was a significant difference between the 2 countries after adjusting for gender and type of university ($P < 0.05$). Generally, Japanese university students (13.5%) had better oral health and lifestyles than their Taiwanese counterparts (10.7%). Table 7 presents the average OSS scores. The averages were 10.7 for Taiwanese university students and 13.5 for their Japanese counterparts. Japanese university students reported significantly better overall oral-health attitudes and lifestyles than their Taiwanese counterparts ($P < 0.001$).

The MOS SF-20

As to general health, when we adjusted for gender and type of university, Japanese university students felt significantly more healthy ($P < 0.001$) (Table 8). On questions concerning their general health, 20% of Japanese university students answered "excellent" compared with only 5—10% of Taiwan university students.

The mean for the PF subscale was 80.8—94.6, that of the RF was 89.7—96.3, that of SF was 85.8—96.9, that of MH was 60.3—66.9, that of HP was 51.5—72.2, and that of pain was 12.7—33 (Table 9).

The Japanese student's PF, SF, HP and pain scores were significantly ($P < 0.001$) better than those of Taiwanese students. The Taiwanese student's MH score was significantly ($P < 0.05$) higher than that of Japanese students. The private university student's RF, SF, MH pain scores were significantly ($P < 0.001$) better than those of national university students. The national university students PF score was higher than that of private university students.

Table 5 Frequencies and percentages for items of Oral Salutogenic Score by country, gender, and type of university.

		Taiwan				Japan			
		Private		National		Private		National	
		Male	Female	Male	Female	Male	Female	Male	Female
Do your gums sometimes swell?	Yes	79 (46.5)	81 (38.5)	100 (40.9)	40 (50.8)	27 (13.5)	27 (13.5)	44 (14.4)	51 (12.4)
	No	91 (53.5)	117 (61.5)	97 (59.1)	64 (49.2)	173 (86.5)	173 (86.5)	261 (85.6)	359 (87.6)
Do you sometimes have a toothache?	Yes	106 (62.4)	131 (74.3)	124 (65.8)	78 (62.9)	64 (32.0)	74 (37.0)	99 (32.5)	117 (28.5)
	No	64 (37.6)	68 (25.7)	73 (34.2)	27 (37.1)	136 (68.0)	126 (63.0)	206 (67.5)	293 (71.5)
Do you often eat between meals?	Yes	86 (50.6)	121 (64.2)	153 (60.8)	68 (77.7)	117 (58.5)	136 (68.0)	172 (56.4)	277 (67.6)
	No	84 (49.4)	78 (35.8)	44 (39.2)	38 (22.3)	83 (41.5)	64 (32.0)	133 (43.6)	133 (32.4)
Do you have any hobbies?	Yes	136 (81.0)	181 (79.0)	183 (91.9)	83 (93.4)	177 (88.5)	153 (76.5)	262 (85.9)	338 (82.4)
	No	32 (19.0)	16 (21.0)	13 (8.1)	22 (6.6)	23 (11.5)	47 (23.5)	43 (14.1)	72 (17.6)
Do you have a family dentist?	Yes	20 (11.8)	21 (21.7)	47 (10.6)	23 (23.9)	73 (36.5)	99 (49.5)	120 (39.3)	232 (56.6)
	No	150 (88.2)	178 (78.3)	150 (89.4)	83 (76.1)	127 (63.5)	101 (50.5)	185 (60.7)	178 (43.4)
Do you go to a dentist soon after you have a toothache?	Yes	91 (53.5)	122 (60.4)	124 (61.3)	64 (62.9)	57 (28.5)	68 (34.0)	111 (36.4)	157 (38.4)
	No	79 (46.5)	77 (39.6)	73 (38.7)	42 (37.1)	143 (71.5)	132 (66.0)	194 (63.6)	252 (61.6)
Do your gums sometimes bleed?	Yes	126 (74.1)	131 (69.5)	137 (65.8)	73 (69.9)	91 (45.5)	88 (44.0)	135 (44.3)	159 (38.8)
	No	44 (25.9)	68 (30.5)	59 (34.2)	32 (30.1)	109 (54.5)	112 (56.0)	170 (55.7)	251 (61.2)
Do you brush your teeth twice or more a day?	Yes	103 (60.6)	141 (78.1)	170 (70.9)	82 (86.3)	110 (55.0)	163 (81.5)	179 (58.7)	339 (82.7)
	No	67 (39.4)	58 (21.9)	27 (29.1)	23 (13.7)	90 (45.0)	37 (18.5)	126 (41.3)	71 (17.3)
Do you have your own toothbrush?	Yes	150 (88.8)	186 (88.5)	186 (93.5)	92 (95.4)	199 (99.5)	200 (100.0)	292 (95.7)	406 (99.0)
	No	19 (11.2)	13 (11.5)	9 (6.5)	12 (4.6)	1 (0.5)	0 (0.0)	13 (4.3)	4 (1.0)
Do you smoke?	Yes	24 (14.1)	30 (4.7)	11 (15.2)	5 (5.6)	69 (34.5)	19 (9.5)	39 (12.8)	11 (2.7)
	No	146 (85.9)	168 (95.3)	186 (84.8)	101 (94.4)	131 (65.5)	181 (90.5)	266 (87.2)	399 (97.3)
									n (%)

Table 6 Odds ratio of Oral Salutogenic Scores for country, gender, and type of university.

	Country (Taiwan)	Gender (Female)	Type of University (Private)
Do your gums sometimes swell?	5.29 (4.20—6.67)*	1.02 (0.81—1.28)	0.95 (0.75—1.21)
Do you sometimes have toothache?	4.05 (3.31—4.97)*	1.03 (0.85—1.26)	1.18 (0.96—1.45)
Do you often eat between meals?	1.10 (0.90—1.34)	1.72 (1.42—2.10)*	0.85 (0.69—1.04)
Do you have any hobbies?	1.39 (1.05—1.84)*	0.73 (0.56—0.95)	0.63 (0.48—0.82)*
Do you have a family dentist?	0.23 (0.18—0.29)*	2.00 (1.63—2.47)*	0.85 (0.68—1.05)
Do you go to a dentist soon after you have a toothache?	2.80 (2.30—3.42)*	1.16 (0.95—1.41)	0.78 (0.64—0.95)*
Do your gums sometimes bleed?	3.07 (2.51—3.77)*	0.91 (0.75—1.10)	1.18 (0.96—1.44)
Do you brush your teeth twice or more a day?	1.33 (1.06—1.66)*	3.08 (2.47—3.85)*	0.77 (0.62—0.96)*
Do you have your own toothbrush?	0.20 (0.12—0.35)	1.68 (1.02—2.79)*	0.83 (0.51—1.35)
Do you smoke?	0.68 (0.50—0.93)*	0.24 (0.17—0.33)*	2.20 (1.63—2.97)*
		Odds ratio (95% CI)	*$P < 0.05$

Logistic-regression analysis; Dependent variable: Yes = 1, No = 0; Country: Japan odds ratio = 1; Gender: Male odds ratio = 1; Type of university: National odds ratio = 1.

None of the 6 subscales of the MOS differed between males and females.

Discussion

In this study, we found that even though values of the DMFT index of Taiwan and Japan were similar to that of the general population in both countries, the numbers of missing/extracted teeth (M index) was, however, an alarming 13 times higher among private university students in Taiwan than of Japanese university students. The OSS further indicated that periodontal diseases (such as gingivitis) are more prevalent among Taiwanese than Japanese students; this result is consistent with another similar study conducted in Taiwan.[38] This troubling finding suggests that the general oral health among Taiwanese university students is far worse than that of Japanese students.

A possible explanation for this is that Taiwan had a late start implementing policies for oral-disease prevention and health promotion. In comparison, Japan had a comprehensive plan in place for oral-disease prevention and health promotion in the prenatal and postnatal period as stipulated under the *Maternal and Child Act* as early as 1965. They are especially successful in caries control and management among 3—5-year-old toddlers, children, and their mothers. For nearly 80 years, the School Dentist

Table 7 Average Oral Salutogenic Scores.

	Private		National	
	Male	Female	Male	Female
Taiwan	10.5 ± 0.3	10.6 ± 0.3	10.9 ± 0.3	10.7 ± 0.3
Japan	13.2 ± 0.2	13.2 ± 0.3	13.5 ± 0.2	14.0 ± 0.2

Source	Degrees of freedom	Sum of squares	Mean square	*F*-value	P value
A	1	3314.1	3314.1	267.5	0.000
B	1	5.1	5.1	0.4	0.520
C	1	86.8	86.8	7.0	0.008
A×B	1	29.3	29.3	2.4	0.124
e	1781	22061.9	12.4		
T	1785	25497.2			

A, Country A1, Taiwan A2, Japan
B, Gender B1, Male B2, female
C, Type of university C1, National C2, Private.

Table 8 Distribution of general health.

	Taiwan				Japan			
	Private		National		Private		National	
	Male	Female	Male	Female	Male	Female	Male	Female
1. Excellent	6 (3.8)	4 (4.1)	20 (10.3)	11 (5.7)	45 (22.5)	40 (20.0)	72 (23.6)	72 (17.6)
2. Very good	26(16.3)	10 (10.3)	41 (21.0)	47 (24.4)	63 (31.5)	49 (24.5)	82 (26.9)	131 (32.0)
3. Good	49 (30.6)	24 (24.7)	58 (29.7)	46 (23.8)	73 (36.5)	82 (41.0)	96 (31.5)	148 (36.1)
4. Fair	71 (44.4)	51 (52.6)	69 (35.4)	74 (38.3)	19 (9.5)	24 (12.0)	42 (13.8)	54 (13.2)
5. Poor	8 (5.0)	8 (8.2)	7 (3.6)	15 (7.8)	0 (0.0)	5 (2.5)	13 (4.3)	5 (1.2)
								n (%)
Polytomous universal model (Logit) analysis								
Threshold				General health = Excellent				−1.39
				General health = Very good				0.02
				General health = Good				1.56
				General health = Fair				4.01
Location				Country = Taiwan				1.37***
				Country = Japan				0
				Gender = Male				0.17+
				Gender = Female				0
				Type of University = National				−0.21*
				Type of University = Private				0

+P < 0.1; *P < 0.05; ***P < 0.001.

System (SDS) has offered comprehensive services in terms of oral-health screening, intensive observations of (CO) and (GO), specific protection such as topical fluoride and dental sealant applications, dental-health education through classroom or individual oral-health instruction for special cases accompanied by school staff, and school dentists being officially involved in school activities to promote the oral health of students in kindergarten and secondary schools.

On the contrary, oral-heath promotion and disease prevention in Taiwanese primary schools had a much later start in 1990. A program for fluoride mouth-rinsing and tooth-brushing after a meal for primary schoolchildren first became effective in 1997; this was later expanded and has covered about 98% of all primary school students since 2005. There are no officially appointed school dentists and no consistent services, and no specific protection in terms of dental sealants or topical fluoride application is provided

Table 9 Different dimensions of the Medical Outcomes Study (MOS).

	Taiwan				Japan			
	Private		National		Private		National	
	Male	Female	Male	Female	Male	Female	Male	Female
Physical functioning	80.8 ± 2.2	86.3± 2.3	93.2 ± 1.3	89.8 ± 1.4	93.6 ± 1.2	94.6 ± 1.1	90.6 ± 1.2	92.7 ± 1.0
Role functioning	92.4 ± 1.4	92.5 ± 1.8	91.7 ± 1.3	89.3 ± 1.5	96.3 ± 1.0	95.3 ± 1.1	89.9 ± 1.2	89.7 ± 1.0
Social functioning	87.3 ± 1.6	85.8 ± 1.9	87.6 ± 1.5	87.2 ± 1.3	96.9 ± 0.8	96.7 ± 0.7	90.7 ± 1.2	94.4 ± 0.7
Mental health	66.9 ± 1.3	66.5 ± 1.6	67.8 ± 1.3	64.9 ± 1.1	68.6 ± 1.4	67.6 ± 1.5	61.7 ± 1.1	60.3 ± 0.9
Health perception	54.5 ± 1.2	51.5 ± 1.9	58.2 ± 1.4	54.8 ± 1.4	72.2 ± 1.2	69.3 ± 1.3	69.5 ± 1.2	71.7 ± 0.9
Pain	29.7 ± 1.7	27.5 ± 1.7	33.0 ± 2.2	31.9 ± 1.5	12.7 ± 1.6	27.1 ± 1.5	13.1 ± 1.5	22.0 ± 1.3
			Country		Type of university			Gender
Physical functioning			***		***			–
Role functioning			–		***			–
Social functioning			***		*			–
Mental health			*		***			–
Health perception			***		+			+
Pain			***		***			–

+P < 0.1; *P < 0.05; **P < 0.01; ***P < 0.001.

for schoolchildren. Although the National Health Insurance Program provides coverage for 98% of the general population, it mostly promotes curative-oriented instead of preventive-oriented policies.

Such delays may have contributed to an overall decline in the oral and dental health of generations of students prior to these oral-health promotion and disease-prevention measures first being implemented. The subjects of this study, university students in Taiwan, are the direct victims of such delays. Their oral-health care was simply overlooked during their junior and senior high school years. Meanwhile, according to findings of the Second International Collaborative Study,[13–15] attitudes of both consumers and oral-health providers toward keeping natural teeth are a major factor in the low missing teeth rate in some study sites such as the US and Japan. Taiwanese parents and caregivers recognize first molars of children as primary teeth and neglect their importance. Subsequently, it is not surprising that university students in Taiwan tend to have more missing and damaged first molars than their Japanese counterparts.

Lack of a family dentist may also account for Taiwanese university students' relatively poorer oral health. In comparison, Japanese university students tend to have their own family dentists. Many studies suggested that such a disparity is caused by the lack of dental insurance and a shortage of dentists leading to issues of poor accessibility and availability to oral-health care in Taiwan. However, such a suggestion fails to account for the actual situation in Taiwan. The true culprit is a national health care system that permits too much freedom for the general public in accessing services from dental practitioners. The Taiwanese National Health Insurance (NHI) system allows the public to choose any medical doctors or dentists as well as clinics or hospitals with few limitations. Essentially, with an NHI card in hand, the public can go to virtually any medical facility throughout the nation.

In addition, the dentist to population ratio in Taiwan is 1:2325.58 (or 43 dentists per every 100,000 people), suggesting a high distribution of dental practitioners among the general public. Hence, there is no obvious shortage of dentists. Moreover, with nearly 98% of the population insured by the affordable NHI, the lack of adequate dental insurance is negligible. Unlike national insurance systems in other countries, the inherent freedom of the Taiwan NHI as well as its low costs associated with dental services has inadvertently become problematic.

When asked about their health and well-being, 47% of respondents answered positively, which is consistent with another study in Taiwan.[38] However, this study found that such a percentage was actually lower than their Japanese counterparts. Further study is needed to determine whether such an inconsistency truly reflects the actual overall public health in each nation or a statistical error driven by cultural differences or cultural conservatism.

As to MOS SF-20 responses, further evaluation is needed since this was the first use of the SF-20 measurement in a study in Taiwan, and thus there is no prior population norm that can be used as a baseline, whereas Japanese study data appear to be comparable to a study in 2000.[27] Based on this research, it appears that the PF, SF and HP values of Taiwanese university students were obviously worse compared to their Japanese counterparts, reflecting a poorer overall population health. Some findings also suggest that there is room for improvement in Taiwan's public health policies that focus on oral-health promotion and disease prevention.

Several studies used the SF-20 as a measure of quality of life and health-related functioning.[32–35] Stewart et al.[32] reported average scores of the PF, RF, MH, and HP subscales of about 90, 88, 78, and 74 respectively in adults with a mean age of 47 years. Our PF and RF subscales had similar scores. However the MH and HP scores were lower, suggesting that university students feel their health is not stable.

Although the population investigated in the present study is not representative of all Taiwanese and Japanese university students, findings in this study showed an oral-health difference between Taiwan and Japan. Due to limitations of this research, we suggest using a more-representative sample in future studies.

It should be noted that this study is preliminary in nature, and further evaluation is needed to validate and develop some aspects of this research. To prove the cross-nation stability of the instruments used in this study, we are concerned with differences in national conditions, culture, values, education, habits, and semantic aspects in translating the Taiwanese and Japanese versions. Nevertheless, 1 thing is certain: urgent efforts are needed to formulate initiatives and policies aimed at oral-health promotion and disease prevention among university students in Taiwan. Presently, the Taiwanese government is contemplating a 5-year plan to promote oral health and oral-disease prevention. The research data contained in this study are a good resource and credible reference which can be used in developing such a national plan.

Conclusions

The status of the oral and general health of Taiwanese undergraduate students appeared to be worse than that of their Japanese counterparts in this study. This might have been due to differences in the regularity of using family dental services, public oral-health policies, effective prevention strategies among the early life stages, and health perceptions of the students.

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